



DESCRIPTIVE NOTES

Introduction

A knowledge of both the magnitude and frequency of occurrence of low flows in streams and rivers is vital in the planning, management and protection of water resources. Low flow information is used by government agencies, municipalities, and consulting engineers for assessing water availability, allocating water savings, and designing water supply and waste-assessment projects.

The purpose of this map is to provide specific data on low flows and flow durations for rivers and streams in northeastern Ontario that flow into Lake Superior, Lake Huron, and the Ottawa River basin. Analyses are presented for those locations with automatic recording and for which several years of continuous daily records are available. These analyses have been made using data for the summer-fall period, June 1 to November 30. Low flows during this period are generally more critical than those in winter because of greater recreational use made of these streams and increased activity of aquatic life at low water levels. Low flows during the summer-fall period result from meteorological conditions that are different from those during the winter period and are regarded as a distinct statistical population.

Where possible, data have been analysed for the 25-year period 1950 to 1977. This period of record has been chosen because it is the longest period for which hydrological data are available for the entire region. Where possible, data have been analysed for the 25-year period 1950 to 1977. This period of record has been chosen because it is the longest period for which hydrological data are available for the entire region. Where possible, data have been analysed for the 25-year period 1950 to 1977. This period of record has been chosen because it is the longest period for which hydrological data are available for the entire region.

Use of a low flow frequency or flow-duration curve for design purposes makes the implicit assumption that basic conditions, during the life of the structure for which the design flow is required, are essentially the same as those prevailing during the period of record used for analyses. It is also assumed that the record used is a representative sample of streamflow at the site, this is most likely to be valid if a long record is utilized.

Flow-Duration Analysis

A flow-duration curve is a cumulative frequency curve which shows the percentage of time specified streamflows are equaled or exceeded during a given period of record. The curve shows the flow characteristics of the stream through its range of discharge without regard to the sequence of streamflow events. The analyses were made with the aid of a digital computer using mean daily flows. From the frequency curve, values were taken at 5%, 20%, 75%, 85%, and 95%. With these flow values and the minimum recorded daily flow, it is possible to reconstruct the curve throughout most of its range.

Low-Flow Frequency Analysis

A low-flow frequency curve is a graph of annual (or seasonal) minimum streamflow versus average probability level or recurrence interval (in years). The analyses were made with the aid of a digital computer considering the annual minimum 7-day flow. From the frequency curve obtained by plotting the results on a probability probability paper, the commonly used design values were taken (7-day Q₁, 7-day Q₂, 7-day Q₃ and 7-day Q₄), with extrapolation of the curve as required. For stations with less than 5 years of data, the frequency curves were not extrapolated beyond the 7-day Q₄.

Selected References

Environment Canada, published annually, Surface water data—Ontario Water Survey, Can. Mat. 1983, N.C. 1983, Probability distribution of low flows, U.S. Geol. Surv., Prof. Paper 434-A, Ontario Ministry of the Environment, 1979, Low-flow characteristics of streams in northeastern Ontario: flow-duration and low-flow frequency curves, Water Res. Br., open file.

Searcy, J.A., 1959, Flow-duration curves, U.S. Geol. Surv., Water Supply Paper 1542-A.

Metric Conversion Factors

1 mile = 1.609 kilometres
1 cubic foot per second = 0.02832 cubic metres per second

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Base map supplied by the Surveys and Mapping Branch, Ministry of Natural Resources.